^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30

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J^π(^{39}K g.s.)=3/2$^+$.

Other main reference: 1974Na09.

Most resonances decay to g.s. of ^{39}K in (p,p) and g.s. of ^{36}Ar in (p,α).

See ^{39}K(p,γ), ^{36}Ar(α,γ):resonances, and ^{40}Ca(p,pα),(p,2p):resonances datasets for additional resonances observed in those reaction.

All data are from (p,p_0) or (p,α_0) channels, with the exception of five resonances from 1969Va14 above 6 MeV which are from p_1 and p_4 channels.

1990Bu02: E=2.4-4.0 MeV proton beams were produced from the TUNL KN Van de Graaff accelerator (overall FWHM≈0.45 keV). Targets were prepared by evaporating 2-3 μg/cm^2 K_2CO_3 (99.97% in ^{39}K) onto gold backings. Charged particles were detected with six surface barrier detectors. Measured $\sigma(\theta)$, for a total of 30 resonances from E(p)(lab)=2389.1 to 3998.2, all with J^π=2$^+$. Deduced widths and other relevant parameters from R-matrix analysis.

1983Sh33 (same group as 1990Bu02): E=3.192-3.224 MeV. Measured $\sigma(\theta)$. Also (pol p,α) for E=3212 keV.

1987WaZI (from the same lab as 1990Bu02): E=1.9-4.0 MeV. Measured $\sigma(\theta)$. A total of 248 resonances reported, fifty of which were assigned 2$^+$. Relevant resonance parameters for proton and α decay of these resonances are given. Only the widths are quoted here. The uncertainty is assigned by the evaluator as 0.5 keV based on overall FWHM=450 eV. The actual uncertainty may be lower than this for strong and well-resolved peaks.

Additional information 1.

1970De30: E=1.03-3.23 MeV. Measured $\sigma(\theta)$. A total of 34 resonances reported between E(p)(lab)=1102.5 and 2983. Deduced levels, J, π, widths.

1974Na09: (p,α) E=3.05-4.20 MeV. Measured $\sigma(\theta)$.

1969Va14: E=6.28-6.73 MeV. Five resonances reported between E(p)(lab)=6350 and 6660 corresponding to p_1 and p_4 channels.

Data are from 1987WaZI unless otherwise noted.

^{40}Ca Levels

Resonance strength is defined as, $S_p=(2J+1)\Gamma_p^2/\Gamma$ for (p,p) resonance, and $S_\alpha=(2J+1)\Gamma_p\Gamma_\alpha/\Gamma$ for (p,α) resonance. The S_α values are given in comments. The Γ_p and Γ_α parameters are also given in comments and are from 1987WaZI, unless otherwise noted. For other relevant parameters see 1987WaZI and 1990Bu02.

E(level)[†]	J^π[‡]	L[d]	S_p (keV)[d]	Comments
9402.9[&] *10*	2$^-$[&]	1	0.7	E(level): analog of 2047 level in ^{40}K (1970De30). E(p)(lab)=1102.5 *10* (1970De30).
9430.1[&] *10*	1$^-$[&]	1	0.7	E(p)(lab)=1130.4 *10* (1970De30).
9452.5[&] *10*	(2,3)$^-$[&]	1	0.6	E(p)(lab)=1153.4 *10* (1970De30).
9534.8[&] *10*	1$^-$[&]	1	1.2	E(p)(lab)=1237.9 *10* (1970De30).
9600.8[&] *10*	3$^-$[&]	1	3.4[e]	E(level): analog of 2070 level in ^{40}K (1970De30). E(p)(lab)=1305.6 *10* (1970De30).
9602.4[&] *10*	1$^-$[&]	1	3.4[e]	E(level): analog of 2103 level in ^{40}K (1970De30). E(p)(lab)=1307.2 *10* (1970De30).
9665.9[&] *15*	(≤3)$^-$[&]	1	1.8	E(p)(lab)=1372.4 *15* (1970De30).
9799[&] *2*	(≤3)$^-$[&]	1	1.0	E(p)(lab)=1509 *2* (1970De30).
9850[&] *2*	(≤3)$^-$[&]	1	1.7	E(p)(lab)=1561 *2* (1970De30).
10064[&] *2*	(1$^-$,2$^+$)[&]			E(p)(lab)=1781 *2*, S_α=9.2 eV (1970De30).
10128[&] *2*	(3$^-$,4$^+$)[&]			E(p)(lab)=1846 *2*, S_α=7.9 eV (1970De30).
10199.3 *5*	1$^-$	1	0.8	J^π: from (1$^-$,2) in 1987WaZI, 1$^-$ in 1970De30. E(level): analog of 2757 level in ^{40}K (1970De30).

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^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30 (continued)

^{40}Ca Levels (continued)

E(level)[†]	J$^\pi$[‡]	L[d]	S$_p$ (keV)[d]	Comments
				E(p)(lab)=1919.1 *5*, Γ_p=1.6 keV (1987WaZI). E(p)(lab)=1921 *2*, S_α=3.4 eV (1970De30).
10265[&] *2*	1$^-$[&]	1	2.8	E(p)(lab)=1987 *2*, S_α=1.5 eV (1970De30).
10270[&] *2*	NATURAL[&]			E(p)(lab)=1992 *2*, S_α=1.7 eV (1970De30).
10275.3 *5*	(1$^-$)			E(p)(lab)=1997.0 *5*, Γ_p=1.6 keV (1987WaZI). J$^\pi$: 2 is also possible (1987WaZI).
10280[&] *2*	1$^-$[&]	1	3.4	E(level): may be the same level as 10275. E(p)(lab)=2002 *2*, S_α=3.4 eV (1970De30); this resonance may be the same as 1997 in 1987WaZI.
10333.9 *5*	(1,3)$^-$			J$^\pi$: from (1$^-$,3$^-$) in 1987WaZI and (1,3)$^-$ from 1970De30. E(p)(lab)=2057.1 *5*, Γ_p=0.11 keV, Γ_α=0.001 keV (1987WaZI). E(p)(lab)=2059 *2*, S_α=22 eV (1970De30).
10362.8 *5*	1$^-$			E(p)(lab)=2086.8 *5*, Γ_p=0.60 keV, Γ_α=0.0030 keV (1987WaZI).
10364.8 *5*	(1,3)$^-$	1	27	J$^\pi$: 1$^-$ in 1987WaZI, 3$^-$ in 1970De30. E(p)(lab)=2088.8 *5*, Γ_p=1.1 keV, Γ_α=0.0050 keV (1987WaZI). E(p)(lab)=2089 *2*, S_α=1.7 eV (1970De30).
10376.8 *5*	1$^-$			E(p)(lab)=2101.1 *5*, Γ_p=0.60 keV, Γ_α=0.0020 keV (1987WaZI).
10385[&] *2*	(1$^-$,2$^+$)[&]			E(p)(lab)=2110 *2*, S_α=2.9 eV (1970De30).
10420.4 *5*	1$^-$			J$^\pi$: (0$^+$,1$^-$,2$^+$) from (p,α) in 1970De30. E(p)(lab)=2145.8 *5*, Γ_p=0.50 keV, Γ_α=0.0028 keV (1987WaZI). E(p)(lab)=2147 *2*, S_α=8.8 eV (1970De30).
10432[&] *2*	(2$^+$)[&]			E(p)(lab)=2158 *2*, S_α=3.8 eV (1970De30).
10443.5 *5*	2$^-$			E(p)(lab)=2169.6 *5*, Γ_p=4.0 keV (1987WaZI).
10447.0 *5*	(1,3)$^-$	1	3.1	J$^\pi$: 1$^-$ in 1987WaZI, 3$^-$ in 1970De30. E(p)(lab)=2173.1 *5*, Γ_p=0.15 keV, Γ_α=0.001 keV (1987WaZI). E(p)(lab)=2174 *2*, S_α=6.5 eV (1970De30).
10516.5 *5*	1$^-$			J$^\pi$: also from 1970De30. E(p)(lab)=2244.4 *5*, Γ_p=1.2 keV, Γ_α=0.010 keV (1987WaZI). E(p)(lab)=2245 *2*, S_α=18 eV (1970De30).
10517.4 *5*	1$^{(+)}$			E(p)(lab)=2245.3 *5*, Γ_p=0.30 keV (1987WaZI).
10529.8 *5*	(1$^+$)			J$^\pi$: 0 is also possible (1987WaZI). E(p)(lab)=2258.0 *5*, Γ_p=0.40 keV (1987WaZI).
10541.7[b] *5*	2$^+$			J$^\pi$: from (p,α) in 1970De30. Other: 0$^+$ from (p,p′) in 1987WaZI. E(p)(lab)=2270.3 *5*, Γ_p=0.16 keV, Γ_α=0.025 keV (1987WaZI). E(p)(lab)=2272 *2*, S_α=41 eV (1970De30).
10596.4 *5*	3$^-$			J$^\pi$: from 1987WaZI, (1,3)$^-$ from (p,α) in 1970De30. E(p)(lab)=2326.4 *5*, Γ_p=0.15 keV, Γ_α=0.0050 keV (1987WaZI). E(p)(lab)=2327 *2*, S_α=63 eV (1970De30).
10598.6 *5*	(1$^+$)			J$^\pi$: 0 is also possible (1987WaZI). E(p)(lab)=2328.6 *5*, Γ_p=0.20 keV (1987WaZI).
10607.6 *5*	0$^{(+)}$			E(p)(lab)=2337.8 *5*, Γ_p=0.20 keV (1987WaZI).
10618.8 *5*	2$^-$			E(p)(lab)=2349.3 *5*, Γ_p=3.5 keV (1987WaZI).
10621.6[b] *5*	0$^+$		15	J$^\pi$: from 1987WaZI. Other: 1$^-$ from (p,p) in 1970De30, 0$^+$ and 2$^+$ favored in (p,α) in 1970De30. E(level): 1970De30 suggest it could be the analog of 3230, 1$^-$ level in ^{40}K; however, the 3230 level has J^π=2$^-$ from Adopted Levels of ^{40}K. It could be that this level in 1970De30 corresponds to the 10618.8, 2$^-$ level above from 1987WaZI. E(p)(lab)=2352.2 *5*, Γ_p=0.030 keV, Γ_α=0.0080 keV (1987WaZI). E(p)=2354 *3*, S_α=14 eV (1970De30).
10633.8 *5*	(1$^-$)			J$^\pi$: 3 is also possible (1987WaZI). E(p)(lab)=2364.7 *5*, Γ_p=1.1 keV, Γ_α=0.0015 keV (1987WaZI).
10648[&] *2*	NATURAL[&]			E(p)(lab)=2379 *3*, S_α=4.0 eV (1970De30).
10656.1 *5*	(1$^-$)			J$^\pi$: 3 is also possible (1987WaZI).

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^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30 (continued)

^{40}Ca Levels (continued)

E(level)[†]	J$^\pi$[‡]	L[d]	S$_p$ (keV)[d]	Comments
				E(p)(lab)=2387.6 *5*, Γ_p=0.59 keV, Γ_α=0.0050 keV (1987WaZI).
10657.6[#] *5*	2$^+$[#]	0	1.2	J$^\pi$: (1,3)$^-$ for 2390 resonance in (p,α) but (1,2)$^+$ and L(p,p)=0 for 2390 resonance in (p,p) in 1970De30. The 2390 resonance in (p,α) in 1970De30 could correspond to the 2387.5 resonance in 1987WaZI. E(p)(lab)=2389.1 *5*, Γ_p=0.350 keV, Γ_α=0.004 keV (1990Bu02). E(p)(lab)=2390 *3*, S$_\alpha$=16 eV (1970De30).
10666.6 *5*	2$^-$	1	17	J$^\pi$: from 1987WaZI, 1$^-$ from (p,p) in 1970De30. E(p)(lab)=2398.4 *5*, Γ_p=2.0 keV (1987WaZI). E(p)(lab)=2400 *3*, S$_\alpha$<1 eV (1970De30).
10675.6 *5*	1$^-$	1	0.5	J$^\pi$: also from 1970De30. E(p)(lab)=2407.6 *5*, Γ_p=1.5 keV, Γ_α=0.060 keV (1987WaZI). E(p)(lab)=2408 *3*, S$_\alpha$=200 eV (1970De30).
10693.1 *5*	1$^+$	0	0.7	J$^\pi$: from 1987WaZI, (1,2)$^+$ in 1970De30. E(p)(lab)=2425.5 *5*, Γ_p=1.1 keV (1987WaZI). E(p)(lab)=2426 *3*, S$_\alpha$<1 eV (1970De30).
10701.1 *5*	0$^+$			E(p)(lab)=2433.7 *5*, Γ_p=0.60 keV, Γ_α=0.001 keV (1987WaZI).
10722.3 *5*	1$^+$			E(p)(lab)=2455.5 *5*, Γ_p=1.1 keV (1987WaZI).
10740.3 *5*	1$^-$	1	1.5	J$^\pi$: also from 1970De30. E(p)(lab)=2473.9 *5*, Γ_p=2.2 keV, Γ_α=0.0060 keV (1987WaZI). E(p)(lab)=2475 *3*, S$_\alpha$=16 eV (1970De30).
10749.0 *5*	0$^+$			J$^\pi$: from 1987WaZI. E(p)(lab)=2482.9 *5*, Γ_p=0.30 keV, Γ_α=0.010 keV (1987WaZI).
10751 *3*	(4$^+$,5$^-$)			J$^\pi$: from 1970De30. E(p)(lab)=2485 *3*, S$_\alpha$=22 eV (1970De30).
10772.3 *5*	(1$^+$)			J$^\pi$: 2 is also possible (1987WaZI). E(p)(lab)=2506.8 *5*, Γ_p=0.050 keV (1987WaZI).
10778.3[#] *5*	2$^+$[#]			E(p)(lab)=2513.0 *5*, Γ_p=0.180 keV, Γ_α=0.004 keV (1990Bu02).
10780.7 *5*	3$^-$	1	35	J$^\pi$: 1$^-$ in 1987WaZI; later corrected to 3$^-$ by the same group Other: 1$^-$ from (p,p) in 1970De30, (1$^-$,2$^+$) from (p,α) in 1970De30 but 2$^+$ is favored. E(level): 1970De30 suggest it could be the analog of 3365, 1$^-$ level in ^{40}K. E(p)(lab)=2515.4 *5*, Γ_p=1.0 keV, Γ_α=0.010 keV (1987WaZI). E(p)(lab)=2514 *3*, S$_\alpha$=77 eV (1970De30); it could also correspond to the 2513.0 resonance in 1990Bu02.
10783.2 *5*	(0$^-$)			J$^\pi$: 1 is also possible (1987WaZI). E(p)(lab)=2518.0 *5*, Γ_p=0.70 keV (1987WaZI).
10802.8 *5*	0$^{(+)}$			J$^\pi$: from 1987WaZI, (1$^-$,2$^+$) from (p,α) in 1970De30. E(p)(lab)=2538.1 *5*, Γ_p=0.50 keV, Γ_α=0.20 keV (1987WaZI). E(p)(lab)=2539 *3*, S$_\alpha$=220 eV (1970De30).
10816.4 *5*	2$^-$	1	13	J$^\pi$: from 1987WaZI, (1$^-$) from (p,p)in 1970De30. E(p)(lab)=2552.0 *5*, Γ_p=6.0 keV (1987WaZI). E(p)(lab)=2552 *3*, S$_\alpha$<1 eV (1970De30).
10816.6 *5*	3$^+$			E(p)(lab)=2552.2 *5*, Γ_p=0.50 keV (1987WaZI).
10833.2 *5*	3$^-$			J$^\pi$: 3$^{(-)}$ from 1987WaZI and (3$^-$,4$^+$) from (p,α) in 1970De30. E(p)(lab)=2569.2 *5*, Γ_p=0.025 keV, Γ_α=0.0009 keV (1987WaZI). E(p)(lab)=2569 *3*, S$_\alpha$=24 eV (1970De30).
10849.3 *5*	2$^-$			E(p)(lab)=2585.8 *5*, Γ_p=11 keV (1987WaZI).
10852.2 *5*	1$^-$	1	30	J$^\pi$: from (1$^-$,2$^-$) in 1987WaZI and 1$^-$ in 1970De30. E(level): analog of 3481 level in ^{40}K (1970De30). E(p)(lab)=2588.7 *5*, Γ_p=2.5 keV (1987WaZI). E(p)(lab)=2588 *3*, S$_\alpha$=10 eV (1970De30).
10861.4[#] *5*	2$^+$[#]			J$^\pi$: also from (p,α) in 1970De30. E(p)(lab)=2598.2 *5*, Γ_p=0.040 keV, Γ_α=0.005 keV (1990Bu02). E(p)(lab)=2599 *3*, S$_\alpha$=24 eV (1970De30).
10869.0 *5*	1$^-$			E(p)(lab)=2606.0 *5*, Γ_p=26 keV, Γ_α=0.070 keV (1987WaZI).
10869.7 *5*	0$^+$			J$^\pi$: 2 is also possible (1987WaZI).

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^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30 (continued)

^{40}Ca Levels (continued)

E(level)[†]	Jπ[‡]	L[d]	S_p (keV)[d]	Comments
				E(p)(lab)=2606.7 *5*, Γ_p=0.40 keV (1987WaZI).
10873.9 *5*	1^-			Jπ: 3 is also possible (1987WaZI).
				E(p)(lab)=2611.0 *5*, Γ_p=4.0 keV (1987WaZI).
10899.3 *5*	1^+			E(p)(lab)=2637.0 *5*, Γ_p=0.41 keV (1987WaZI).
10914.8 *5*	1^-	1	6.9	Jπ: also from 970De30.
				E(p)(lab)=2652.9 *5*, Γ_p=5.0 keV, Γ_α=0.040 keV (1987WaZI).
				E(p)(lab)=2652 *3*, S_α=110 eV (1970De30).
10915.7 *5*	3^+			Jπ: 1^+,2^+ in 1987WaZI; later corrected to 3^+ by the same group.
				E(p)(lab)=2653.9 *5*, Γ_p=0.70 keV (1987WaZI).
10932.7 *5*	1^-	1	15	E(p)(lab)=2671.3 *5*, Γ_p=2.0 keV, Γ_α=0.0080 keV (1987WaZI).
				E(p)(lab)=2673 *3*, S_α=53 eV (1970De30).
10933.2[a] *5*	2^-			E(p)(lab)=2672.0 *5*, Γ_p=0.10 keV (1987WaZI).
10946.9[#] *5*	2^+[#]			E(p)(lab)=2685.9 *5*, Γ_p=0.215 keV, Γ_α=0.011 keV (1990Bu02).
10950.8 *5*	1^-	1	30	Jπ: also from 1970De30.
				E(p)(lab)=2689.9 *5*, Γ_p=7.0 keV (1987WaZI).
				E(p)(lab)=2689 *3*, S_α=100 eV (1970De30).
10953.6 *5*	$0^{(+)}$			E(p)(lab)=2692.7 *5*, Γ_p=0.20 keV, Γ_α=0.020 keV (1987WaZI).
				E(p)(lab)=2695 *3*, S_α=27 eV (1970De30).
10988.7 *5*	2^-			E(p)(lab)=2728.7 *5*, Γ_p=9.0 keV (1987WaZI).
10989.4 *5*	(1^+)			Jπ: 0 is also possible (1987WaZI).
				E(p)(lab)=2729.4 *5*, Γ_p=0.4 keV (1987WaZI).
10995[&] *3*	(1^-)[&]	1	20	E(level): analog of 3630 level in ^{40}K (1970De30).
				E(p)(lab)=2735 *3*, S_α<1 eV (1970De30).
10998.9 *5*	$(1,3)^-$			Jπ: also from 1970De30.
				E(p)(lab)=2739.2 *5*, Γ_p=0.20 keV, Γ_α=0.0020 keV (1987WaZI).
				E(p)(lab)=2742 *3*, S_α=35 eV (1970De30).
11007.2 *5*	1^-	1	2.1	Jπ: from 1987WaZI, $(1,3)^-$ in 1970De30.
				E(p)(lab)=2747.7 *5*, Γ_p=5.0 keV, Γ_α=0.010 keV (1987WaZI).
				E(p)(lab)=2750 *3*, S_α=9 eV (1970De30).
11024.2 *5*	$(1,3)^-$	1	0.7	Jπ: (1^-) from 1970De30, $3^{(-)}$ in 1987WaZI, L(p,p)=1 from $3/2^+$.
				E(p)(lab)=2765.1 *5*, Γ_p=0.10 keV, Γ_α=0.012 keV (1987WaZI).
				E(p)(lab)=2767 *3*, S_α=270 eV (1970De30).
11036.3 *5*	(1^+)			Jπ: 2 is also possible (1987WaZI).
				E(p)(lab)=2777.5 *5*, Γ_p=0.10 keV (1987WaZI).
11044.5[#] *5*	2^+[#]	0	1.0	Jπ: 2^+ from 1970De30.
				E(p)(lab)=2785.9, Γ_p=0.50 keV, Γ_α=0.002 keV (1990Bu02).
				E(p)(lab)=2789 *3*, S_α=6 eV (1970De30).
11073.5 *5*	2^+			E(p)(lab)=2815.7 *5*, Γ_p=0.66 keV, Γ_α=0.0006 keV (1987WaZI).
11078.4 *5*	1^-			E(p)(lab)=2820.7 *5*, Γ_p=1.2 keV, Γ_α=0.0040 keV (1987WaZI).
11083.6 *5*	(1^+)			Jπ: 0,2 are also possible (1987WaZI).
				E(p)(lab)=2826.1 *5*, Γ_p=0.35 keV (1987WaZI).
				E(p)(lab)=2825 *3*, S_α=11 eV (1970De30).
11089.3 *5*	$0^{(+)}$			Jπ: from 1987WaZI, $4+(1^-,3^-)$ from (p,α) for a 11091 level in 1970De30 could indicate a different level.
				E(p)(lab)=2831.9 *5*, Γ_p=0.10 keV, Γ_α=0.0060 keV (1987WaZI).
				E(p)(lab)=2834 *3*, S_α=6.1 eV (1970De30).
11107.0 *5*	1^-			E(p)(lab)=2850.1 *5*, Γ_p=3.9 keV (1987WaZI).
11112[&] *3*	0^-[&]	1	5.2	E(level): analog of 3768 level in ^{40}K (1970De30).
				E(p)(lab)=2855 *3*, S_α<1 eV (1970De30); it could correspond to the 2850.1 resonance in 1987WaZI.
11119.0[#] *5*	2^+[#]			Jπ: also from 1970De30.
				E(p)(lab)=2862.3 *5*, Γ_p=0.040 keV, Γ_α=0.006 keV (1990Bu02).
				E(p)(lab)=2865 *3*, S_α=21 eV (1970De30).
11129.1 *5*	4^+			Jπ: also from 1970De30.

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^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30 (continued)

^{40}Ca Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	L[d]	S$_p$ (keV)[d]	Comments
				E(p)(lab)=2872.7 *5*, Γ_p=0.11 keV, Γ_α=0.0014 keV (1987WaZI).
				E(p)(lab)=2875 *3*, S$_\alpha$=19 eV (1970De30).
11145.2 *5*	1$^{(-)}$			E(p)(lab)=2889.2 *5*, Γ_p=0.20 keV, Γ_α=0.0020 keV (1987WaZI).
11145.8 *5*	1$^+$			E(p)(lab)=2889.8 *5*, Γ_p=0.20 keV (1987WaZI).
11157.2 *5*	2$^-$			E(p)(lab)=2901.5 *5*, Γ_p=48 keV (1987WaZI).
11161.5 *5*	4$^{(+)}$			E(p)(lab)=2905.9 *5*, Γ_p=0.040 keV, Γ_α=0.0008 keV (1987WaZI).
11162.9 *5*	2$^+$			E(p)(lab)=2907.4 *5*, Γ_p=3.5 keV (1987WaZI).
				E(p)(lab)=2907 *3*, S$_\alpha$=12 eV (1970De30).
11167.4 *5*	4$^+$			J$^\pi$: also from 1970De30.
				E(p)(lab)=2912.0 *5*, Γ_p=0.080 keV, Γ_α=0.0030 keV (1987WaZI).
				E(p)(lab)=2914 *3*, S$_\alpha$=31 eV (1970De30).
11187.6 *5*	3$^-$			E(p)(lab)=2932.7 *5*, Γ_p=1.4 keV, Γ_α=0.0016 keV (1987WaZI).
11202.9 *5*	(2$^-$)			J$^\pi$: 1,3 are also possible (1987WaZI).
				E(p)(lab)=2948.4 *5*, Γ_p=6.0 keV (1987WaZI).
11212.6 *5*	3$^-$	1	175	E(level): analog of 3867 level in ^{40}K (1970De30).
				J$^\pi$: also from 1970De30.
				E(p)(lab)=2958.4 *5*, Γ_p=2.8 keV, Γ_α=0.0014 keV (1987WaZI).
				E(p)(lab)=2962 *3*, S$_\alpha$<1 eV (1970De30). Γ_p=25 keV from S$_p$=175 keV assuming Γ=Γ_p is much greater than Γ_p=2.8 keV, which could indicate a different level at 11317 *3*.
11217.8 *5*	4$^+$			E(p)(lab)=2963.7 *5*, Γ_p=1.4 keV, Γ_α=0.001 keV (1987WaZI).
11231.4 *5*	2$^-$	1	3	J$^\pi$: from 1987WaZI, (1,2,3)$^-$ in 1970De30.
				E(p)(lab)=2977.6 *5*, Γ_p=3.0 keV (1987WaZI).
				E(p)(lab)=2972 *3*, S$_\alpha$<1 eV (1970De30).
11236[&] *3*	1$^-$[&]	1	11.7	E(p)(lab)=2983 *3*, S$_\alpha$<1 eV (1970De30).
11246.8 *5*	3$^-$			J$^\pi$: also from 1970De30.
				E(p)(lab)=2993.4 *5*, Γ_p=0.080 keV, Γ_α=0.012 keV (1987WaZI).
				E(p)(lab)=2996 *3*, S$_\alpha$=190 eV (1970De30).
11255.9 *5*	1$^+$			E(p)(lab)=3002.8 *5*, Γ_p=0.30 keV (1987WaZI).
11260.8 *5*	(0$^-$)			J$^\pi$: 1 is also possible (1987WaZI).
				E(p)(lab)=3007.8 *5*, Γ_p=6.0 keV (1987WaZI).
11264.4[#] *5*	2$^+$[#]			J$^\pi$: also from 1970De30.
				E(p)(lab)=3011.4 *5*, Γ_p=0.325 keV, Γ_α=0.016 keV (1990Bu02).
				E(p)(lab)=3013 *3*, S$_\alpha$=190 eV (1970De30).
11284.3 *5*	(2$^-$)			J$^\pi$: 1 is also possible (1987WaZI).
				E(p)(lab)=3032.0 *5*, Γ_p=0.60 keV.
11289.8 *5*	1$^+$			E(p)(lab)=3037.5 *5*, Γ_p=1.0 keV.
11300.3 *5*	1$^+$			E(p)(lab)=3048.3 *5*, Γ_p=0.40 keV.
11302.5 *5*	(1$^-$)			E(p)(lab)=3050.6 *5*, Γ_p=1.2 keV.
				J$^\pi$: 2 is also possible (1987WaZI).
11320.0 *5*	(0$^-$)			E(p)(lab)=3068.5 *5*, Γ_p=1.8 keV.
				J$^\pi$: 1 is also possible (1987WaZI).
11322.0[#] *5*	2$^+$[#]			J$^\pi$: (1$^-$,2$^+$) from 1970De30.
				E(p)(lab)=3070.5 *5*, Γ_p=0.475 keV, Γ_α=0.041 keV (1990Bu02).
				E(p)(lab)=3073 *3*, S$_\alpha$=440 eV (1970De30).
11329.3[a] *5*	2$^+$			E(p)(lab)=3078.1 *5*.
11330.7 *5*	1$^-$			E(p)(lab)=3079.5 *5*, Γ_p=4.0 keV, Γ_α=0.030 keV.
				E(p)(lab)=3083 *3*, S$_\alpha$=52 eV (1970De30).
11338.7 *5*	(1$^+$)			J$^\pi$: 0,2 are also possible (1987WaZI).
				E(p)(lab)=3087.7 *5*, Γ_p=0.20 keV.
11342.6 *5*	2$^-$			E(p)(lab)=3091.7 *5*, Γ_p=40 keV.
11346.4 *5*	4$^{(+)}$			E(p)(lab)=3095.6 *5*, Γ_p=0.020 keV, Γ_α=0.0005 keV.
11351.5 *5*	1$^+$			J$^\pi$: from 1987WaZI, but π=natural from (p,α) in 1970De30 is inconsistent.
				E(p)(lab)=3100.8 *5*, Γ_p=0.80 keV.
				E(p)(lab)=3099 *3*, S$_\alpha$=18 eV (1970De30).

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^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30 (continued)

^{40}Ca Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	Comments
11362.4 *5*	1^+	E(p)(lab)=3112.0 *5*, Γ_p=1.2 keV.
11366.0[#b] *5*	2^+[#]	E(p)(lab)=3115.7 *5*, Γ_p=0.090 keV, Γ_α=0.100 keV (1990Bu02).
11367.0 *5*	2^-	E(p)(lab)=3116.7 *5*, Γ_p=4.4 keV.
11368.3 *5*	$4^{(+)}$	E(p)(lab)=3118.0 *5*, Γ_p=0.020 keV, Γ_α=0.0014 keV.
11371.4 *5*	2^+	J$^{\pi}$: (1^-,2^+) from 1970De30. E(p)(lab)=3121.2 *5*, Γ_p=1.4 keV, Γ_α=0.0040 keV. E(p)(lab)=3119 *3*, S_α=400 eV (1970De30).
11382.1[#] *5*	2^+[#]	J$^{\pi}$: (0^+,1^-,2^+) from (p,α) in 1970De30. E(p)(lab)=3132.2 *5*, Γ_p=2.500 keV, Γ_α=0.065 keV (1990Bu02). E(p)(lab)=3134 *3*, S_α=360 eV (1970De30).
11393.0 *5*	$1^{(-)}$	E(p)(lab)=3143.4 *5*, Γ_p=0.10 keV, Γ_α=0.0004 keV.
11404.2 *5*	1^-	E(p)(lab)=3154.9 *5*, Γ_p=3.5 keV, Γ_α=0.0060 keV.
11407.0 *5*	1^+	E(p)(lab)=3157.7 *5*, Γ_p=0.22 keV.
11414.8 *5*	4^+	J$^{\pi}$: also from (p,α) in 1970De30. E(p)(lab)=3165.7 *5*, Γ_p=0.10 keV, Γ_α=0.0050 keV. E(p)(lab)=3169 *3*, S_α=70 eV (1970De30).
11420.3 *5*	3^-	E(p)(lab)=3171.4 *5*, Γ_p=0.30 keV, Γ_α=0.0009 keV.
11432.7 *5*	1^-	E(p)(lab)=3184.1 *5*, Γ_p=0.30 keV, Γ_α=0.0020 keV.
11436.8[#] *5*	2^+[#]	J$^{\pi}$: also from (p,α) in 1970De30. E(p)(lab)=3188.3 *5*, Γ_p=0.200 keV, Γ_α=0.015 keV (1990Bu02). E(p)(lab)=3192 *3*, S_α=170 eV (1970De30).
11447.2 *5*	1^-	E(p)(lab)=3199.0 *5*, Γ_p=5.0 keV, Γ_α=0.34 keV. E(p)(lab)=3200 *3*, S_α=950 eV (1970De30).
11451.4 *5*	1^+	E(p)(lab)=3203.3 *5*, Γ_p=0.60 keV.
11455.4 *5*	3^-	E(p)(lab)=3207.4 *5*, Γ_p=0.050 keV, Γ_α=0.010 keV.
11460.4[#] *5*	2^+[#]	J$^{\pi}$: also from (p,α) in 1970De30. E(p)(lab)=3212.5 *5*, Γ_p=1.030 keV, Γ_α=0.140 keV (1990Bu02). E(p)(lab)=3214 *3*, S_α=1500 eV (1970De30).
11465.1 *5*	$2^{(+)}$	E(p)(lab)=3217.3 *5*, Γ_p=0.026 keV, Γ_α=0.10 keV. E(p)(lab)=3221 *3*, S_α=57 eV (1970De30).
11468.7 *5*	2^-	E(p)(lab)=3221.0 *5*, Γ_p=0.40 keV.
11479.8 *5*	1^+	E(p)(lab)=3232.4 *5*, Γ_p=0.30 keV.
11486.7[b] *5*	0^+	E(p)(lab)=3239.5 *5*, Γ_p=0.10 keV, Γ_α=0.0060 keV.
11489.6 *5*	1^+	E(p)(lab)=3242.5 *5*, Γ_p=0.40 keV.
11514.6[#] *5*	2^+[#]	E(p)(lab)=3268.1 *5*, Γ_p=0.500 keV, Γ_α=0.115 keV (1990Bu02).
11515.2 *5*	$1^{(-)}$	E(p)(lab)=3268.7 *5*, Γ_p=4.2 keV, Γ_α=0.030 keV.
11519.0 *5*	2^+	E(p)(lab)=3272.6 *5*, Γ_p=0.70 keV.
11537.9 *5*	2^-	E(p)(lab)=3292.0 *5*, Γ_p=8.0 keV.
11542.2 *5*	2^+	E(p)(lab)=3296.4 *5*, Γ_p=0.60 keV, Γ_α=0.017 keV.
11543.7 *5*	(1^+)	E(p)(lab)=3297.9 *5*, Γ_p=0.90 keV. J$^{\pi}$: 2 is also possible (1987WaZI).
11546.7 *5*	2^-	E(p)(lab)=3301.0 *5*, Γ_p=18 keV.
11554.5 *5*	1^-	E(p)(lab)=3309.0 *5*, Γ_p=35 keV, Γ_α=0.60 keV.
11559.1 *5*	(2^+)	E(p)(lab)=3313.7 *5*, Γ_p=0.40 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11563.5 *5*	(2^-)	E(p)(lab)=3318.3 *5*, Γ_p=0.40 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11577.9 *5*	2^-	E(p)(lab)=3333.0 *5*, Γ_p=1.0 keV.
11578.0[#] *5*	2^+[#]	E(p)(lab)=3333.1 *5*, Γ_p=0.180 keV, Γ_α=0.045 keV (1990Bu02).
11585.6 *5*	2^-	E(p)(lab)=3340.9 *5*, Γ_p=0.15 keV.
11597.2 *5*	(2^+)	E(p)(lab)=3352.8 *5*, Γ_p=0.30 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11602.3 *5*	2^+	E(p)(lab)=3358.0 *5*, Γ_p=0.30 keV.
11603.4[#] *5*	2^+[#]	E(p)(lab)=3359.1 *5*, Γ_p=0.250 keV, Γ_α=0.030 keV (1990Bu02).

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^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30 (continued)

^{40}Ca Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	Comments
11605.3 *5*	1$^-$	E(p)(lab)=3361.1 *5*, Γ_p=12 keV, Γ_α=1.0 keV.
11611.1 *5*	1$^-$	E(p)(lab)=3367.1 *5*, Γ_p=0.70 keV, Γ_α=0.16 keV.
11614.0 *5*	(2$^-$)	E(p)(lab)=3370.0 *5*, Γ_p=0.50 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11628.5 *5*	(3$^+$)	E(p)(lab)=3384.9 *5*, Γ_p=0.70 keV. J$^{\pi}$: 2 is also possible (1987WaZI).
11629.1[#] *5*	2$^+$[#]	E(p)(lab)=3385.5 *5*, Γ_p=0.070 keV, Γ_α=0.015 keV (1990Bu02). Additional information 2.
11638.1[b] *5*	1$^-$	E(p)(lab)=3394.8 *5*, Γ_p=0.080 keV, Γ_α=0.010 keV.
11645.0 *5*	(2$^-$)	E(p)(lab)=3401.8 *5*, Γ_p=0.60 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11646.9[#] *5*	2$^+$[#]	E(p)(lab)=3403.8 *5*, Γ_p=0.600 keV, Γ_α=0.002 keV (1990Bu02). Γ_p=0.20 in 1987WaZI.
11650.8 *5*	2$^{(+)}$	E(p)(lab)=3407.8 *5*, Γ_p=0.10 keV, Γ_α=0.080 keV.
11652.2[a] *5*	3$^-$	E(p)(lab)=3409.2 *5*.
11653.5[#] *5*	2$^+$[#]	E(p)(lab)=3410.5 *5*, Γ_p=1.500 keV, Γ_α=0.090 keV (1990Bu02).
11661.7[b] *5*	1$^-$	E(p)(lab)=3419.0 *5*, Γ_p=0.060 keV, Γ_α=1.5 keV.
11672.8 *5*	(2$^-$)	E(p)(lab)=3430.4 *5*, Γ_p=0.20 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11677.1[#] *5*	2$^+$[#]	E(p)(lab)=3434.7 *5*, Γ_p=0.180 keV, Γ_α=0.775 keV (1990Bu02).
11687.5 *5*	(1$^+$)	E(p)(lab)=3445.4 *5*, Γ_p=0.50 keV. J$^{\pi}$: 0 is also possible (1987WaZI).
11689.2 *5*	(2$^-$)	E(p)(lab)=3447.2 *5*, Γ_p=0.60 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11692.8 *5*	4$^{(+)}$	E(p)(lab)=3450.9 *5*, Γ_p=0.012 keV, Γ_α=0.0090 keV.
11696.3 *5*	0$^{(-)}$	E(p)(lab)=3454.5 *5*, Γ_p=0.60 keV.
11703.6 *5*	0$^+$	E(p)(lab)=3461.9 *5*, Γ_p=4.5 keV, Γ_α=0.15 keV.
11704.6 *5*	2$^-$	E(p)(lab)=3463.0 *5*, Γ_p=3.0 keV.
11707.8 *5*	1$^-$	E(p)(lab)=3466.3 *5*, Γ_p=0.30 keV, Γ_α=0.0020 keV.
11713.6 *5*	1$^+$	E(p)(lab)=3472.2 *5*, Γ_p=0.20 keV.
11715.7 *5*	2$^-$	E(p)(lab)=3474.4 *5*, Γ_p=1.5 keV.
11721.2 *5*	1$^+$	E(p)(lab)=3480.0 *5*, Γ_p=1.5 keV.
11724.1 *5*	3$^{(-)}$	E(p)(lab)=3483.8 *5*, Γ_p=0.050 keV, Γ_α=0.010 keV.
11731.0 *5*	1$^{(-)}$	E(p)(lab)=3490.4 *5*, Γ_p=0.64 keV, Γ_α=3.0 keV.
11731.1 *5*	1$^+$	E(p)(lab)=3490.5 *5*, Γ_p=0.40 keV.
11738.8 *5*	2$^-$	E(p)(lab)=3498.2 *5*, Γ_p=3.0 keV.
11742.8[#] *5*	2$^+$[#]	E(p)(lab)=3502.1 *5*, Γ_p=0.750 keV, Γ_α=0.320 keV (1990Bu02). Additional information 3.
11744.6 *5*	4$^+$	E(p)(lab)=3504.8 *5*, Γ_p=0.050 keV, Γ_α=0.50 keV. J$^{\pi}$: 2$^+$ in 1987WaZI; later corrected to 4$^+$ by the same group.
11749.5 *5*	1$^{(-)}$	E(p)(lab)=3509.7 *5*, Γ_p=0.70 keV, Γ_α=2.5 keV.
11753.4[a] *5*	2$^-$	E(p)(lab)=3513.1 *5*.
11754.0 *5*	3$^-$	E(p)(lab)=3513.7 *5*, Γ_p=0.30 keV, Γ_α=0.050 keV. J$^{\pi}$: 1$^-$ in 1987WaZI, later corrected to 3$^-$ by the same group.
11757.3 *5*	1$^+$	E(p)(lab)=3517.4 *5*, Γ_p=0.60 keV.
11768.0 *5*	2$^-$	E(p)(lab)=3528.2 *5*, Γ_p=15 keV.
11782.6 *5*	3$^{(-)}$	E(p)(lab)=3543.5 *5*, Γ_p=0.021 keV, Γ_α=0.020 keV.
11788.5[#] *5*	2$^+$[#]	E(p)(lab)=3549.0 *5*, Γ_p=2.200 keV, Γ_α=0.340 keV (1990Bu02).
11792.4 *5*	1$^+$	E(p)(lab)=3553.5 *5*, Γ_p=0.46 keV.
11799.2 *5*	4$^{(+)}$	E(p)(lab)=3560.2 *5*, Γ_p=0.010 keV, Γ_α=0.17 keV.
11804.1[b] *5*	0$^+$	E(p)(lab)=3565.3 *5*, Γ_p=0.060 keV, Γ_α=0.20 keV.
11809.0 *5*	(1$^+$)	E(p)(lab)=3570.2 *5*, Γ_p=1.1 keV. J$^{\pi}$: 2 is also possible (1987WaZI).

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^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30 (continued)

^{40}Ca Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	Comments
11810.9[#] 5	2$^+$[#]	E(p)(lab)=3572.0 5, Γ_p=0.770 keV, Γ_α=0.975 keV (1990Bu02). Additional information 4.
11811.6 5	3$^-$	E(p)(lab)=3572.7 5, Γ_p=0.26 keV, Γ_α=0.0020 keV.
11820.5 5	3$^-$	E(p)(lab)=3581.9 5, Γ_p=3.5 keV, Γ_α=0.030 keV. J$^{\pi}$: 1$^-$ in 1987WaZI; later corrected to 3$^-$ by the same group.
11830.8[#b] 5	2$^+$[#]	E(p)(lab)=3592.4 5, Γ_p=0.070 keV, Γ_α=0.230 keV (1990Bu02).
11839.2 5	0$^+$	E(p)(lab)=3601.0 5, Γ_p=1.0 keV, Γ_α=0.050 keV.
11844.1 5	1$^+$	E(p)(lab)=3606.0 5, Γ_p=0.78 keV.
11855.8[#] 5	2$^+$[#]	E(p)(lab)=3618.0 5, Γ_p=0.325 keV, Γ_α=0.060 keV (1990Bu02).
11857.3 5	(1$^+$)	E(p)(lab)=3619.6 5, Γ_p=1.3 keV. J$^{\pi}$: 2 is also possible (1987WaZI).
11863.3 5	(3$^-$)	E(p)(lab)=3625.7 5, Γ_p=0.41 keV, Γ_α=0.0080 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11864.7 5	(0$^+$)	E(p)(lab)=3627.2 5, Γ_p=1.6 keV. J$^{\pi}$: 1,2 are also possible (1987WaZI).
11868.8 5	(4$^+$)	E(p)(lab)=3631.4 5, Γ_p=0.030 keV, Γ_α=0.0020 keV. J$^{\pi}$: 2 is also possible (1987WaZI).
11870.0[b] 5	3$^-$	E(p)(lab)=3632.6 5, Γ_p=0.010 keV, Γ_α=0.030 keV. J$^{\pi}$: 2$^+$ in 1987WaZI, later corrected to 3$^-$ by the same group.
11872.2[#] 5	2$^+$[#]	E(p)(lab)=3634.8 5, Γ_p=0.450 keV, Γ_α=0.420 keV (1990Bu02).
11878.0 5	1$^-$	E(p)(lab)=3640.8 5, Γ_p=0.30 keV, Γ_α=0.015 keV.
11884.5 5	1$^+$	E(p)(lab)=3647.5 5, Γ_p=0.80 keV.
11888.3 5	4$^+$	E(p)(lab)=3651.4 5, Γ_p=0.10 keV, Γ_α=0.025 keV.
11890.9 5	1$^-$	E(p)(lab)=3654.0 5, Γ_p=20 keV.
11894.0 5	(2$^-$)	E(p)(lab)=3657.2 5, Γ_p=1.0 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11901.4 5	1$^+$	E(p)(lab)=3664.8 5, Γ_p=0.70 keV.
11915.9 5	3$^-$	E(p)(lab)=3679.7 5, Γ_p=1.0 keV, Γ_α=0.0040 keV.
11924.6[#] 5	2$^+$[#]	E(p)(lab)=3688.6 5, Γ_p=2.200 keV, Γ_α=0.002 keV (1990Bu02).
11930.0 5	4$^{(+)}$	E(p)(lab)=3694.2 5, Γ_p=0.030 keV, Γ_α=0.0015 keV.
11933.3 5	1$^-$	E(p)(lab)=3697.5 5, Γ_p=16 keV, Γ_α=0.074 keV.
11935.0 5	1$^+$	E(p)(lab)=3699.3 5, Γ_p=0.80 keV.
11937.3 5	2$^-$	E(p)(lab)=3701.6 5, Γ_p=0.60 keV.
11940.4 5	1$^+$	E(p)(lab)=3704.8 5, Γ_p=0.40 keV.
11942.8 5	3$^-$	E(p)(lab)=3707.3 5, Γ_p=0.48 keV, Γ_α=0.0090 keV.
11945.0 5	1$^-$	E(p)(lab)=3709.5 5, Γ_p=0.40 keV, Γ_α=0.0080 keV.
11948.4 5	0$^+$	E(p)(lab)=3713.0 5, Γ_p=0.30 keV, Γ_α=0.010 keV.
11958.7 5	(2$^+$)	E(p)(lab)=3723.6 5, Γ_p=1.0 keV, Γ_α=0.0050 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11962.9 5	0$^+$	E(p)(lab)=3727.9 5, Γ_p=0.30 keV, Γ_α=0.0060 keV.
11969.8 5	1$^+$	E(p)(lab)=3735.0 5, Γ_p=0.80 keV.
11971.0[#] 5	2$^+$[#]	E(p)(lab)=3736.2 5, Γ_p=0.240 keV, Γ_α=0.018 keV (1990Bu02).
11975.1[b] 5	1$^-$	E(p)(lab)=3740.4 5, Γ_p=0.040 keV, Γ_α=0.015 keV.
11983.3 5	(2$^-$)	E(p)(lab)=3748.8 5, Γ_p=1.6 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
11987.1 5	3$^-$	E(p)(lab)=3752.7 5, Γ_p=0.30 keV, Γ_α=0.080 keV.
11994.0 5	0$^-$	E(p)(lab)=3759.8 5, Γ_p=3.0 keV.
12001.3 5	(2$^+$)	E(p)(lab)=3767.3 5, Γ_p=1.0 keV, Γ_α=0.020 keV. J$^{\pi}$: 1 is also possible (1987WaZI).
12007.4 5	1$^+$	E(p)(lab)=3773.5 5, Γ_p=0.55 keV.
12010.4 5	2$^-$	E(p)(lab)=3776.6 5, Γ_p=6.0 keV.
12012.2[b] 5	4$^+$	E(p)(lab)=3778.5 5, Γ_p=0.010 keV, Γ_α=0.0006 keV.
12023.6 5	1$^+$	E(p)(lab)=3790.2 5, Γ_p=0.90 keV.

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^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30 (continued)

^{40}Ca Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	Comments
12026.9 *5*	4^+	E(p)(lab)=3793.5 *5*, Γ_p=0.20 keV, Γ_α=0.018 keV.
12033.8 *5*	3^-	E(p)(lab)=3800.6 *5*, Γ_p=0.30 keV, Γ_α=0.0050 keV.
12047.7 *5*	2^+	E(p)(lab)=3814.9 *5*, Γ_p=2.5 keV, Γ_α=0.15 keV.
12056.4 *5*	1^-	E(p)(lab)=3823.8 *5*, Γ_p=2.0 keV.
12058.9 *5*	2^+	E(p)(lab)=3826.4 *5*, Γ_p=1.1 keV, Γ_α=0.10 keV.
12067.3 *5*	2^+	E(p)(lab)=3835.0 *5*, Γ_p=1.0 keV, Γ_α=0.15 keV.
12067.8 *5*	4^+	E(p)(lab)=3835.5 *5*, Γ_p=1.1 keV, Γ_α=0.01 keV. J$^{\pi}$: 2^+ in 1987WaZI; later corrected to 4^+ by the same group. Γ_a of 0.10 listed in 1987WaZI was later corrected to 0.01 by the same group.
12076.8[a] *5*	2^-	E(p)(lab)=3844.7 *5*, Γ_p=3.0 keV, Γ_α=0.070 keV.
12082.0 *5*	$4^{(+)}$	E(p)(lab)=3850.1 *5*, Γ_p=0.020 keV, Γ_α=0.001 keV.
12086.1 *5*	$4^{(+)}$	E(p)(lab)=3854.3 *5*, Γ_p=0.010 keV, Γ_α=0.001 keV.
12088.8 *5*	2^-	E(p)(lab)=3857.0 *5*, Γ_p=10.0 keV.
12089.7 *5*	2^+	E(p)(lab)=3858.0 *5*, Γ_p=4.2 keV, Γ_α=20 keV.
12093.1 *5*	$4^{(+)}$	E(p)(lab)=3861.4 *5*, Γ_p=0.030 keV, Γ_α=0.030 keV.
12095.1 *5*	2^+	E(p)(lab)=3863.5 *5*, Γ_p=9.0 keV, Γ_α=0.40 keV.
12106.0 *5*	$4^{(+)}$	E(p)(lab)=3874.7 *5*, Γ_p=0.050 keV, Γ_α=0.040 keV.
12110.7 *5*	2^+	E(p)(lab)=3879.5 *5*, Γ_p=2.0 keV.
12115.1 *5*	3^-	E(p)(lab)=3884.0 *5*, Γ_p=0.60 keV, Γ_α=0.18 keV.
12125.9 *5*	(3^+)	E(p)(lab)=3895.1 *5*, Γ_p=1.0 keV. J$^{\pi}$: 2 is also possible (1987WaZI).
12132.7 *5*	(4^+)	E(p)(lab)=3902.1 *5*, Γ_p=0.060 keV, Γ_α=0.070 keV. J$^{\pi}$: 2 is also possible (1987WaZI).
12134.9 *5*	(4^+)	E(p)(lab)=3904.3 *5*, Γ_p=0.10 keV, Γ_α=0.0030 keV. J$^{\pi}$: 2 is also possible (1987WaZI).
12141.2[#] *5*	2^+[#]	E(p)(lab)=3910.8 *5*, Γ_p=1.00 keV, Γ_α=0.240 keV (1990Bu02).
12152.3 *5*	4^+	E(p)(lab)=3922.2 *5*, Γ_p=0.33 keV, Γ_α=0.025 keV.
12157.8 *5*	$4^{(+)}$	E(p)(lab)=3927.8 *5*, Γ_p=0.080 keV, Γ_α=0.040 keV.
12159.4 *5*	$4^{(+)}$	E(p)(lab)=3929.5 *5*, Γ_p=0.080 keV, Γ_α=0.0030 keV.
12177.7 *5*	$1^{(-)}$	E(p)(lab)=3948.2 *5*, Γ_p=0.20 keV, Γ_α=0.020 keV.
12180.2 *5*	2^+	E(p)(lab)=3950.8 *5*, Γ_p=1.4 keV, Γ_α=0.10 keV.
12184.5 *5*	2^-	E(p)(lab)=3955.2 *5*, Γ_p=2.0 keV.
12192.7[#] *5*	2^+[#]	E(p)(lab)=3963.6 *5*, Γ_p=1.00 keV, Γ_α=0.240 keV (1990Bu02).
12196.3 *5*	$1^{(-)}$	E(p)(lab)=3967.3 *5*, Γ_p=0.80 keV, Γ_α=0.15 keV.
12201.2 *5*	3^-	E(p)(lab)=3972.3 *5*, Γ_p=2.0 keV, Γ_α=0.080 keV.
12209.3 *5*	0^-	E(p)(lab)=3980.6 *5*, Γ_p=1.0 keV.
12211.9[b] *5*	4^+	E(p)(lab)=3983.3 *5*, Γ_p=0.020 keV, Γ_α=0.0090 keV.
12217.7 *5*	1^+	E(p)(lab)=3989.2 *5*, Γ_p=1.5 keV.
12224.3 *5*	1^-	E(p)(lab)=3996.0 *5*, Γ_p=1.4 keV, Γ_α=0.060 keV.
12226.4[#] *5*	2^+[#]	E(p)(lab)=3998.2 *5*, Γ_p=0.425 keV, Γ_α=0.009 keV (1990Bu02). Additional information 5.
12237.7 *5*	1^+	E(p)(lab)=4009.8 *5*, Γ_p=2.0 keV.
12244.0 *5*	4^+	E(p)(lab)=4016.2 *5*, Γ_p=0.020 keV, Γ_α=0.010 keV.
12245.2 *5*	1^-	E(p)(lab)=4017.5 *5*, Γ_p=1.0 keV, Γ_α=1.0 keV.
12256[c] *4*		E(p)(lab)=4029 *4*, Γ=5.5 keV (1974Na09).
12270[c] *4*	(2^+)	E(p)(lab)=4043 *4*, Γ=5.8 keV (1974Na09).
12280[c] *4*		E(p)(lab)=4053 *4*, Γ=4.2 keV (1974Na09).
12292[c] *4*		E(p)(lab)=4066 *4*, Γ=4.0 keV (1974Na09).
12299[c] *4*	(2^+)	E(p)(lab)=4073 *4*, Γ=4.0 keV (1974Na09).
12305[c] *4*	(1^-)	E(p)(lab)=4079 *4*, Γ=6.7 keV (1974Na09).
12331[c] *4*	2^+	E(p)(lab)=4106 *4*, Γ=7.3 keV (1974Na09).
12348[c] *4*		E(p)(lab)=4123 *4*, Γ=6.0 keV (1974Na09).
12357[c] *4*	$(3^-,1^-)$	E(p)(lab)=4132 *4*, Γ=5.5 keV (1974Na09).

Continued on next page (footnotes at end of table)

^{39}K(p,p),(p,α):resonances 1987WaZI,1990Bu02,1970De30 (continued)

^{40}Ca Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	Comments
12368[c] *4*		E(p)(lab)=4143 *4*, Γ=6.7 keV (1974Na09).
12376[c] *4*		E(p)(lab)=4152 *4*, Γ=5.9 keV (1974Na09).
12381[c] *4*		E(p)(lab)=4157 *4*, Γ=4.0 keV (1974Na09).
12399[c] *4*	(2$^+$,1$^-$)	E(p)(lab)=4175 *4*, Γ=6.7 keV (1974Na09).
12406[c] *4*		E(p)(lab)=4182 *4*, Γ=3.5 keV (1974Na09).
12411[c] *4*		E(p)(lab)=4188 *4*, Γ=4.0 keV (1974Na09).
12419[c] *4*		E(p)(lab)=4195 *4*, Γ=5.4 keV (1974Na09).
12425[c] *4*		E(p)(lab)=4202 *4*, Γ=6.4 keV (1974Na09).
14370[@]		E(p)(lab)=6350 (1969Va14).
14460[@]		E(p)(lab)=6440 (1969Va14).
14530[@]		E(p)(lab)=6520 (1969Va14).
14600[@]		E(p)(lab)=6590 (1969Va14).
14680[@]		E(p)(lab)=6660 (1969Va14).

[†] From E(p)(lab) values and the adopted S(p)=8328.17 *2* (2012Wa38). The E(p)(lab) values are given in comments and are from 1987WaZI, unless otherwise stated. Resonances listed at E(p)(lab)=2740.6 and 2764.6 by 1987WaZI were later deleted by the same group. Uncertainty for E(p)(lab) is assigned here as 0.5 keV (same as FWHM), but the relative uncertainty is expected to be much smaller, probably ≈0.1 keV.

[‡] From 1987WaZI, unless otherwise stated. When J^{π} given in parentheses, other less likely spin(s) which give similar fits are given in comments. When parity appears in parentheses, resonance is too weak in (p,p) to determine parity unambiguously. Values from (p,p) are extracted from theoretical fits to experimental cross sections while values from (p,α) are from angular distributions of emitted α partilces (1987WaZI,1970De30,1974Na09,1990Bu02). Resonances in the (p,α) reactions have natural parities.

[#] From 1990Bu02. See also 1987WaZI from the same group. The Γ_p and Γ_{α} values are also given in 1987WaZI.

[@] From 1969Va14 only from p_1 and p_4 channels.

[&] From 1970De30.

[a] Not listed in 1987WaZI, but added later by the same group.

[b] 1987WaZI state that resonance does not appear in (p,p_0). It probably corresponds to (p,p_1).

[c] From 1974Na09.

[d] From 1970De30.

[e] For 9600.8+9602.4 (1970De30).